WHAT IS CLAIMED IS:

1. A system for improving transmission of DSL signals over a local loop, the system comprising:

a loop extender with communications, control, and diagnostic functionality; and

a central office controller coupled to the loop extender via the local loop for controlling the loop extender.

2. The system of claim 1, wherein the central office controller includes:

a modem for communication with the loop extender;

a processor coupled to the modem; and

loop extender management software executable by the processor.

3. The system of claim 2, wherein the modem communicates in a voice-frequency band.

4. The system of claim 2, wherein the processor generates control signals.

5. The system of claim 4, wherein the central office controller transmits the control signals to the loop extender via the local loop when POTS signals are not present on the local loop.

6. The system of claim 2, further comprising:

an ATU-C coupled to the local loop configured to receive and transmit DSL signals; and

a DSLAM controller coupled to the processor and the ATU-C configured to control access to the local loop.

7. The system of claim 6, wherein the processor receives local loop information from the DSLAM controller.

8. The system of claim 6, wherein the processor sends instructions to the DSLAM controller for operating the ATU-C.

9. The system of claim 5, wherein the loop extender includes:

a POTS loading coil adapted to be coupled to the local loop for improving transmission of POTS band signals over the local loop;

a diagnostic/control unit coupled to the local loop for providing communications, control, and diagnostic functionality; and

amplification circuitry capacitively coupled to the local loop via bypass switches for providing DSL signal amplification.

10. The system of claim 9, wherein the diagnostic/control unit includes:

a modem coupled to the local loop for communication with the central office controller;

an analog multiplexer/analog-to-digital converter (AMADC) coupled to the amplification circuitry for sampling DSL signal data via diagnostic lines; and

a diagnostic/control processor (DCP) coupled to the modem and the AMADC for processing the control signals received via the modem and analyzing the sampled DSL signal data from the AMADC.

11. The system of claim 10, wherein the DCP processes the sampled DSL signal data to compute average power.

12. The system of claim 10, wherein the DCP processes the sampled DSL signal data to compute peak power.

13. The system of claim 10, wherein the DCP processes the sampled DSL signal data to compute root-mean-square power.

14. The system of claim 10, wherein the DCP processes the sampled DSL signal data to compute power spectral density.

15. The system of claim 10, further comprising a bypass relay for coupling the DCP to the bypass switches.

16. The system of claim 15, wherein the DCP upon receiving control signals from the central office controller, uncouples the amplification circuitry from the local loop by activating a deactivated bypass relay.

17. The system of claim 15, wherein the DCP upon receiving control signals from the central office controller, couples the amplification circuitry to the local loop by deactivating an activated bypass relay.

18. A method for improving transmission of DSL signals over a local loop, comprising the steps of:

configuring a loop extender with communications, control, and diagnostic functionality; and

controlling the loop extender with a central office controller coupled to the loop extender via the local loop.

19. The method of claim 18, wherein the step of controlling the loop extender includes the steps of:

generating control signals via a processor; and

transmitting the control signals to the loop extender via the local loop when POTS signals are not present on the local loop.

20. The method of claim 19, wherein the control signals are transmitted in a voice-frequency band.

21. The method of claim 19, wherein the method further includes the steps of:

receiving and transmitting DSL signals via an ATU-C coupled to the local loop; and

controlling access to the local loop via a DSLAM controller coupled to the processor and the ATU-C.

22. The method of claim 21, wherein the processor receives local loop information from the DSLAM controller.

23. The method of claim 21, wherein the processor sends instructions to the DSLAM controller for operating the ATU-C.

24. The method of claim 19, wherein the method further includes the steps of:

improving transmission of POTS band signals over the local loop via a POTS loading coil coupled to the local loop;

providing communications, control, and diagnostic functionality via a diagnostic/control unit coupled to the local loop; and

providing DSL signal amplification via amplification circuitry capacitively coupled to the local loop via bypass switches.

25. The method of claim 24, wherein the step of providing communications, control, and diagnostic functionality includes the steps of:

receiving the control signals from the central office controller;

processing the received control signals;

sampling DSL signal data in accordance with the processed control signals; and

processing the sampled DSL signal data.

26. The method of claim 25, wherein the step of processing the sampled DSL signal data includes computing average power.

27. The method of claim 25, wherein the step of processing the sampled DSL signal data includes computing peak power.

28. The method of claim 25, wherein the step of processing the sampled DSL signal data includes computing root-mean-square power.

29. The method of claim 25, wherein the step of processing the sampled DSL signal data includes computing power spectral density.

30. The method of claim 25, wherein the amplification circuitry is uncoupled from the local loop in accordance with the processed control signals.

31. The method of claim 25, wherein the amplification circuitry is coupled to the local loop in accordance with the processed control signals.

32. A system for improving transmission of DSL signals over a local loop, the system comprising:

a central office controller, the central office controller including,

a first modem coupled to the local loop,

a processor coupled to the first modem,

loop extender management software executable by the processor for generating control signals,

an ATU-C coupled to the local loop configured to receive and transmit DSL signals, and

a DSLAM controller coupled to the processor and the ATU-C configured to control access to the local loop; and

a loop extender coupled to the central office controller via the local loop, the loop extender including,

a POTS loading coil adapted to be coupled to the local loop for improving transmission of POTS band signals over the local loop,

amplification circuitry capacitively coupled to the local loop via bypass switches for providing DSL signal amplification,

a second modem coupled to the local loop for receiving the control signals,

an AMADC coupled to the amplification circuitry for sampling DSL signal data via diagnostic lines, and

a DCP coupled to the second modem and the AMADC for processing the control signals received via the second

modem and analyzing the sampled DSL signal data from the AMADC.

33. The system of claim 32, wherein the first modem and second modem communicate in a voice-frequency band.

34. The system of claim 32, wherein the central office controller transmits the control signals to the loop extender via the local loop when POTS signals are not present on the local loop.

35. The system of claim 32, wherein the DCP processes the sampled DSL signal data to compute average power.

36. The system of claim 32, wherein the DCP processes the sampled DSL signal data to compute peak power.

37. The system of claim 32, wherein the DCP processes the sampled DSL signal data to compute root-mean-square power.

38. The system of claim 32, wherein the DCP processes the sampled DSL signal data to compute power spectral density.

39. The system of claim 32, further comprising a bypass relay for coupling the DCP to the bypass switches.

40. The system of claim 39, wherein the DCP upon receiving control signals from the central office controller, uncouples the amplification circuitry from the local loop by activating a deactivated bypass relay.

41. The system of claim 39, wherein the DCP upon receiving control signals from the central office controller, couples the amplification circuitry to the local loop by deactivating an activated bypass relay.

42. A method for improving transmission of DSL signals over a local loop, the method comprising the steps of:

generating control signals in a central office;

transmitting the control signals and DSL signals over the local loop;

providing DSL signal amplification via amplification circuitry coupled to the local loop;

sampling DSL signals within the amplification circuitry in accordance with the control signals received by a diagnostic/control unit coupled to the amplification circuitry; and

processing the sampled DSL signals to evaluate amplification circuitry performance.

43. The method of claim 42, wherein the step of processing the sampled DSL signals includes computing average power.

44. The method of claim 42, wherein the step of processing the sampled DSL signals includes computing peak power.

45. The method of claim 42, wherein the step of processing the sampled DSL signals includes computing root-mean-square-power.

46. The method of claim 42, wherein the step of processing the sampled DSL signals includes computing power spectral density.

47. The method of claim 42, wherein the method further includes the step of uncoupling the amplification circuitry from the local loop in accordance with control signals received by the diagnostic/control unit.

48. The method of claim 42, wherein the method further includes the step of coupling the amplification circuitry to the local loop in accordance with control signals received by the diagnostic/control unit.

49. A system for improving transmission of DSL signals, the system comprising:

means for generating control signals;

means for transmitting the control signals and DSL signals;

means for amplifying the DSL signals;

means for processing the control signals;

means for sampling the DSL signals in accordance with the processed control signals; and

means for processing the sampled DSL signals to evaluate the means for amplifying.